GEOGRAPHIC SCHOOL BULLETINS

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CONTENTS

- Arctic DEW Line
- Index, Vol. 37, Nos. 1-10
- Map of Creation
- Leaping Trout
- Fiji Islands

FIJIAN HUCK FINNS balance their bamboo raft in a stream on Viti Levu Island. Their elders use rafts to float produce from Fiji's volcanic mountains to the coral-fringed coasts.

LUIS MARDEN,
NATIONAL GEOGRAPHIC STAFF

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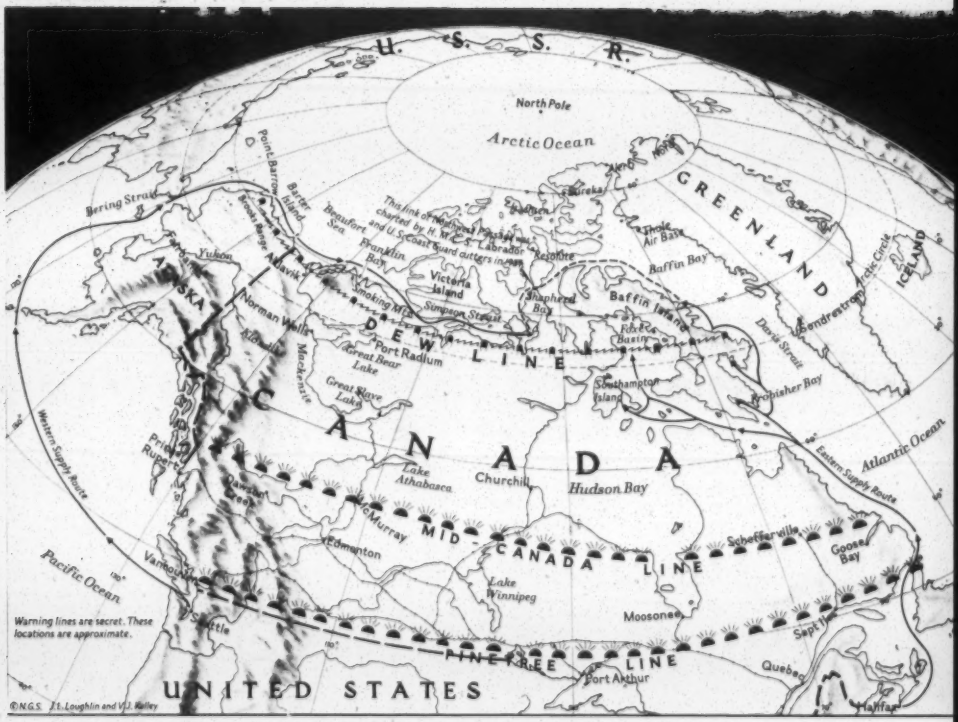

LIKE ELECTRONIC FENCES, three radar warning lines girdle Canada. The role of the Mid-Canada Line, built and operated by Canadians, is to confirm DEW Line's preliminary alert. The Pinetree Line, in operation since 1955, collects data on height, speed, and direction of enemy bombers. Ships and aircraft extend the chain to 15,000 miles, encircling North America. Information from any link is relayed to inland centers where electronic computers digest facts and frame combat orders. A new agreement with Denmark paves the way for outposts across Greenland.

111 BAFFIN ISLAND'S icy mountains offer scant protection for this outpost. Like many other DEW Line sites, it is accessible only by airplane or helicopter. Blinding "whiteouts" are a frequent hazard.

WESTERN ELECTRIC COMPANY FOR U. S. AIR FORCE

UMI

H. K. LAYNG

DEW LINE

Remakes the Arctic

"THE ARCTIC will never be the same again."

The former Alaskan prospector eyed construction workers as they pieced together a big yellow plastic dome.

As he well knew, the radome —so called because it houses a search radar antenna—has wrought a revolution in the North. Similar radomes now hump above the tundra along a 5,000-mile arc from Alaska to Baffin Island.

To them, and the men who built and man them, goes credit for giving the Nation crucial minutes of warning of any enemy air attack across the Pole. During these vital minutes, interceptors could take to the air, bombers retaliate from bases around the world, civilians take cover.

This is the DEW Line—Distant Early Warning Line. To make it work, men had to learn to protect not only themselves but their most sensitive machines from the breathless cold. Today the civilians and Air Force men who operate the DEW Line exist comfortably where Eskimos feared to live. They speak to each other over a radiotelephone party line at a latitude where no radio ever functioned effectively before. They bounce in jeeps over 215 miles of new roadway, and enjoy fresh meat and vegetables (and mail from home) flown in by airplanes on regular schedules.

But the North is still formidable. When a DEW Liner ventures out of his warm hut on a repair mission, he may step into 50-degree-below-zero temperature. Even a fur-trimmed parka does not offer full protection. A visitor recalls that "the wind hurls the snow with blinding ferocity, peppering your face with white buckshot."

Hardy technicians, who agree to serve tours of 16 months away from their families, man three kinds of stations. Headquarters for each 500-mile sector is a 50-man main station, with airplane hangar, garage, and storage facilities in addition to its radome. At approximately 100-mile intervals between main bases stand smaller auxiliary stations. About 20 technicians run each radome-crowned "aux."

Finally, three-man intermediate stations, whose nickname logically enough is "I-site," fill in gaps in the line. These possess no search radar equipment, but transmit a semiradar signal that will bounce off any object that crosses its beam and automatically sound an alarm at the nearest main or aux.

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Africa 44-45, 79 *See also* Guinea; Libya; Madagascar; Morocco; United Arab Republic
Agriculture 92; Africa 63; Alaska 29; Denmark 58-59; Egypt 15; Hawaii 33; Iraq 17; Japan 51; Libya 89 *See also* Fairs
Alaska 25-32
Animals bear 30; camels 19; dairy 7, 12, 29, 58; deer 55; donkeys 22, 46; fox 31; horses 11, 34, 36, 47, 72, 88; hounds 78-79; moose 31; pigs 101; platypus 61, 66-67; ponies 73; rodents 3; seals 31; sheep 104-105, mountain 30; zebu 108
Arabian Peninsula 16
Arctic region radar stations 110-112
Argentina Patagonia 82-84
Asia *See* Arabian Peninsula; Formosa; Iran; Iraq; Israel; Japan; Jordan; Lebanon; Turkey; United Arab Republic
Astronomy moon 80-81
Atom 2-4
Australia 65, 104, 105
Austria trade fair 43
Aviation airliner 75; jet fighter 93
Belgium Brussels World's Fair 40
Birds Galapagos 77; grouse 87; rhea 82
Blue Ridge Parkway 6-7
Boats and ships canoe 86; dugout 90; fishing 27, 45, 50, 63, 95; raft 109; sailboat 91
Canada 111-112; British Columbia 85, 94-96; Nova Scotia 10-12
Canals Panama 35; Suez Canal 14
China 5
Clothing U. S. Presidents' wives 55
Conservation 31, 76, 86-87
Denmark 58-60 *See also* Iceland
DEW Line 110-112
Dwellings Denmark 60; Egypt 15; Fiji 118; Guinea 63; Jordan, refugees 19; New Orleans 72; Poland 99, 102-103
Education American Univ., Beirut 21; Fiji 118; Iraq, technical 17; Mexico 68-69; Peru 37; Univ., British Columbia 95
Europe *See* Austria; Belgium; Denmark; France; Poland; Turkey; Yugoslavia
Fairs 40-43
Fiji Islands 109; 118-120
Fish and fishing Africa 45; Alaska 27, 28; Canada 11, 95; Denmark 60; Fiji 119; Iceland 74; Japan 50; trout 116-117
Florida 91
Formosa 5
Fossils 114-115
France 1, 8-9 *See also* Madagascar
Galapagos Islands 76-77
Gas British Columbia 96
Guinea 62-64
Harbors and ports Africa 44; Copenhagen 60; Guinea 63; New Orleans 70-71; Turkey 24
Hawaii 33
Iceland 73-75
Industries *See* Agriculture; Atom; Fairs; Fish and fishing; Gas; Lumber and lumbering; Mines and minerals; Oil
Infrared radiation 91-92
Insects honeybee 56-57
Iran 23
Iraq 13, 14, 17
Islands *See* Fiji; Formosa; Galapagos; Hawaii; Iceland; Japan; Madagascar
Israel 20
Japan 49-52; fair 42
Jordan 19
Lakes Argentina 82, 84; Canada 12; Victoria 44-45
Latin America *See* Argentina; Mexico; Peru
Lebanon 21
Libya 88-89
Lincoln, Abraham 48
Louisiana New Orleans 70-72
Lumber and lumbering British Columbia 94
Machinery concrete-laying 38; farm 41, 59, 92; lawn mower 41; pipe-laying 96; projector 43; steam engine 53; steam shovel 35
Madagascar 106-108
Maps Arctic, radar stations 111; Australia 66; China coast 5; Eastern Mediterranean 18; Mississippi River 71; Poland 99; U.S.S.R. satellites 99
Markets British Columbia 96; Denmark, fish 60; Libya, souk 89; Mexico 69; Poland 101; supermarket, Alaska 28, Peru 39
Mexico 68-69, 91
Mines and minerals coal 65, 100; copper 39; gold 46, 47; uranium 2, 4
Morocco 41, 42
Mountains Alaska 25, 29; Andes 39, 82, 83, 84; Black Hills 46-48; Blue Ridge 6-7; Canadian Rockies 85, 94, 96; Fuji 51; Hawaii 33; Iceland 73, 75; Iran 23
Museum Smithsonian Institution 53-55
Musical instruments 22, 98; Guinea 64
National Geographic Magazine 2, 17, 28, 35, 47, 64, 65, 67, 68, 72, 82, 83, 94, 99
National Geographic Society 15, 17, 54, 78
National Parks Argentina 83, 84; Blue Ridge 6-7
New York 86-87
North Carolina 6-7
North Dakota 36
Oil Arabian Peninsula 16; Iran 23; Iraq 17
Pennsylvania Pittsburgh 4
Peru 37-39
Plants 3, 33, 49; water hyacinths 90-91
Poland 97-103; trade fair 43
Radar DEW Line warning system 110-112
Religious shrines church, Kodiak 25, Nova Scotia 10, Poland 98; Fuji, Mt. 51; minaret 13, mosque 24
Reptiles iguana 76; tortoise 77
Rivers 90-91; Mississippi 70; Nile 15
Roosevelt, Theodore 34-36
South Dakota 46-48
Sports 34; mountain climbing 46; skiing 84
Statues Abraham Lincoln 48; Christ of the Andes 83; Evangeline 10; St. John 98; sourdough 26
Transportation 9, 16, 72; space, fictional 80 *See also* Animals; Aviation; Boats and ships
Trees 96; date 17; Forest Preserve, N.Y. 86-87; palm 118; ravenala 107
Turkey 24; trade fair 43
United Arab Republic 14, 15, 22
United States *See* Alaska; Blue Ridge; Hawaii; Louisiana; New York; North Dakota; South Dakota; Washington, D. C.
U. S. Army infantry 93
U. S. Navy jet fighter 93
Virginia 6-7
Washington, D.C. Smithsonian Institution 53-55
Yugoslavia trade fair 41

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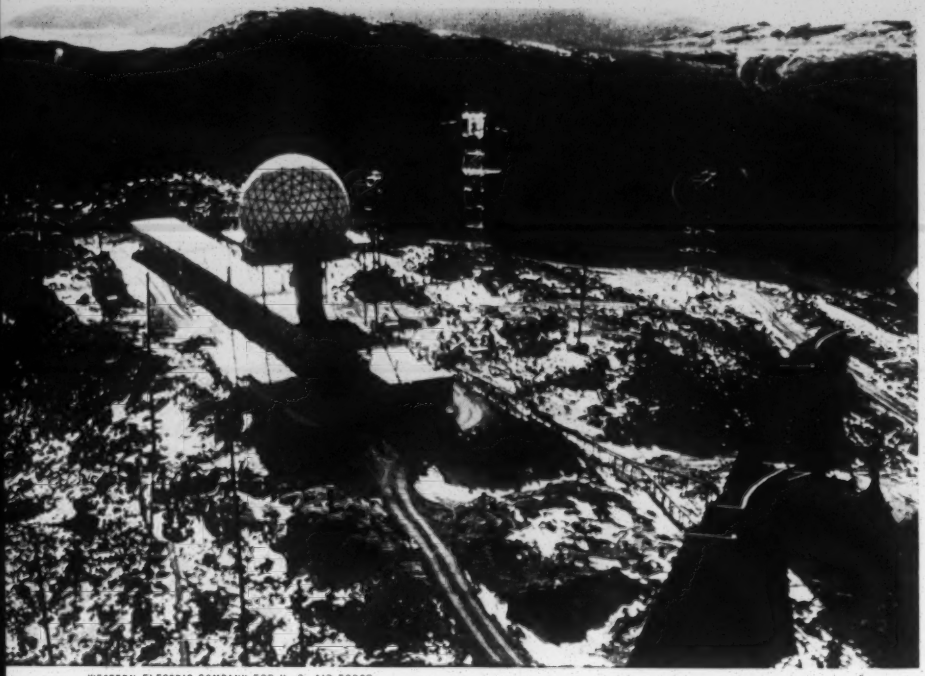


WESTERN ELECTRIC COMPANY FOR U. S. AIR FORCE

A GIANT JIGSAW puzzle, the plastic radome grows from diamond-shaped pieces. Such 55-foot domes have withstood Arctic winds of 100 miles an hour.

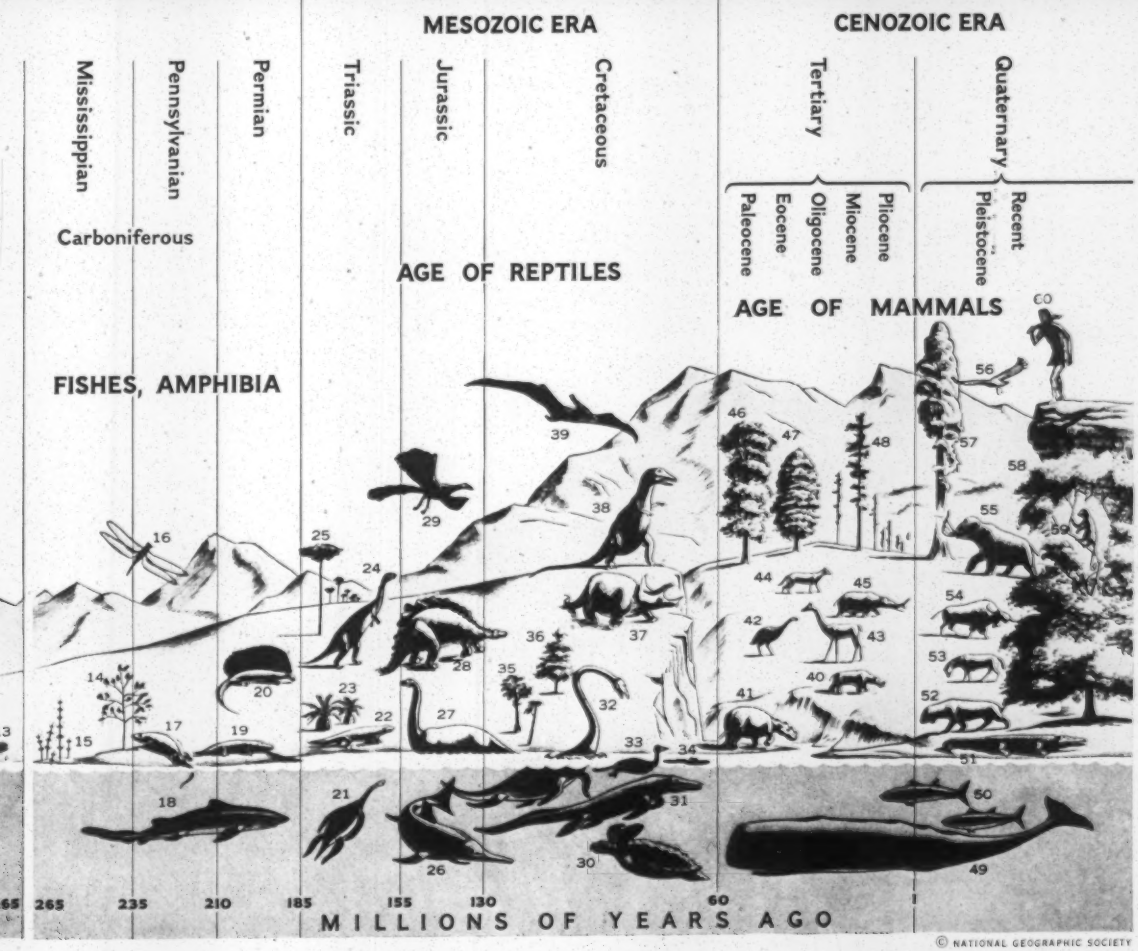
GENE GAINES, PIX

RADAR POST GUARDS U. S.

"Home" to many a DEW Liner is an auxiliary station like this. His job is to insure that the station performs its two-pronged mission: detect approaching enemy aircraft, and flash the warning southward. Far-out detection work is done by the search radar which sprays electronic pulses through the thin plastic radome. The giant, dish-shaped antennas mounted at the center of the site detect low-flying aircraft trying to sneak by. Should a warning have to be dispatched, it is transmitted by a newly developed type of ultrahigh-frequency radio from the antennas in the foreground (shaped like the screen of a drive-in movie).

Construction of the DEW Line, completed only last year, posed nearly insurmountable problems. One sample: metal panels commonly used in modern Arctic living quarters would create electronic interference; hence the cubicles coupled together for DEW Line housing were constructed of wood. A. P. M.

See Also: *National Geographic Magazine*—July 1958, "DEW Line, Sentry of the Far North" ($1). *Geographic School Bulletins*—November 4, 1957, "Found: The Northwest Passage" (10¢).



MODERN LIFE TAPS RICH FOSSIL LODE

YOU CAN'T DRIVE a car without the help of fossils.

Your home is probably heated by them.

Your pen point, your schoolhouse, even your belt buckle would be greatly different if fossils didn't work for you.

Far from being mere curiosities that mystify museum visitors, fossils affect much of your daily life.

Animals and plants from eons ago, transformed by earth pressure, give us petroleum and coal. The remains of innumerable ancient seashells make up limestone, important in construction and in the production of iron and steel.

Today, science and industry join in a world-wide fossil hunt. Gulf Coast drillers set pipe with fossil experts at their elbows to help locate oil-bearing strata. The search for fossil fuels has turned up many specimens that increase the total of man's knowledge.

See Also: *National Geographic Magazine*—March, 1956, "Fossils Lift the Veil of Time" ($1).

UMI

EVOLUTION'S TAPESTRY

CREATION FIRST stirred in the warm seas of the Pre-Cambrian Era, but left no fossil record. Earliest traces are one-celled algae, dead two billion years. Evolution's threads remained almost invisible until the Cambrian, half a billion years ago. Sea animals without backbones (figures 2 through 8) had developed by that time—and are still going strong. Fishes swam into prominence as the earliest animals with backbones (9-11). They gave rise to amphibians (13) who had legs and lungs and could walk the land. The mighty dinosaurs (27, 28, 38) descended from them. Slowly new forms evolved. Reptiles branched out into birds (29) and mammals. The largest and the brainiest mammals, whales (49) and men (60), appeared in the Cenozoic Era, which includes our own time. Plants achieved a parallel development, from primitive seaweeds (1) through the flowering plants (35).

In addition to providing this panorama of life, fossils are essential to modern industry—see right hand column.

PRE-CAMBRIAN ERA

PALEOZOIC ERA

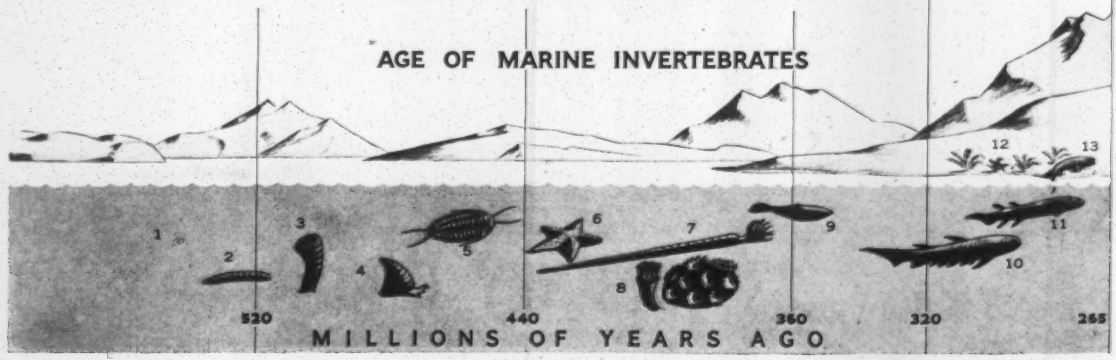
Cambrian | Ordovician | Silurian | Devonian

Diagram scales geology's four grand eras and their subdivisions to show relative duration. Exceptions are Pre-Cambrian, which would occupy five extra pages in this magazine, and the Quaternary, which is rightfully entitled only to 1/50 inch.

1. Microscopic Algae
2. Segmented Worm
3. Archaeocyathus
4. Snail
5. Trilobite
6. Starfish
7. Giant Nautiloid
8. Corals
9. Heterostracan
10. Acanthodes
11. Osteolepis
12. Ferns
13. Ichthyostega
14. Lepidodendron
15. Calamites
16. Meganeuron
17. Eogyrinus
18. Shark
19. Seymouria
20. Edaphosaurus
21. Plesiosaur
22. Cynognathus
23. Cycads
24. Plateosaurus
25. Araucarites
26. Ichthyosaur
27. Brontosaurus
28. Stegosaurus
29. Archaeopteryx
30. Archelon
31. Mosasaur
32. Elasmosaurus
33. Hesperornis
34. Water Lily
35. Palm
36. Ginkgo
37. Triceratops
38. Tyrannosaurus
39. Pteranodon
40. Diceratherium
41. Uintatherium
42. Diatryma
43. Alticamelus
44. Mesohippus
45. Amebelodon
46. Tulip Tree
47. Maple
48. Pine
49. Whale
50. Bluefin Tuna
51. Crocodile
52. Saber-toothed Cat
53. Equus
54. Bison
55. Woolly Mammoth
56. Teratornis
57. Sequoia
58. Black Oak
59. Monkey
60. Man

AGE OF

AGE OF MARINE INVERTEBRATES



Angler's Heart Leaps Up With Trout

THROWING itself from its quiet pool like a streak of scaled lightning, the rainbow trout strikes at a lure—and an angler's heart jumps with it. The fish smacks the fly at a speed of about 20 feet a second, and takes off with the hook even faster—better than 20 miles an hour. The happy struggle is on. If he's skillful enough, a tasty dinner rewards the fisherman.

To insure his sport, some $40,000,000 is spent in the United States each year for breeding, stocking, and managing of game fish.

In eastern States, the arching rainbow is an importation. Native to the west coast, rainbows were planted in the Atlantic and Great Lakes drainage systems to replace the brook trout—still the most sought by fly casters.

Early settlers found American streams teeming with fish, as the forests teemed with game. Mostly they fished for the pot. As population grew and danger of starvation receded, they could spare more time for sport fishing. But the streams were changing.

The lumberman's ax whacked down the thick virgin forests. The trees that shaded the brooks disappeared; water temperatures rose. Soil-holding vegetation was cut; silt from farmland washed in. Settlements dumped their wastes into the rivers, and pollution increased. Many waters were warming and cloudy. Brook trout couldn't live in them.

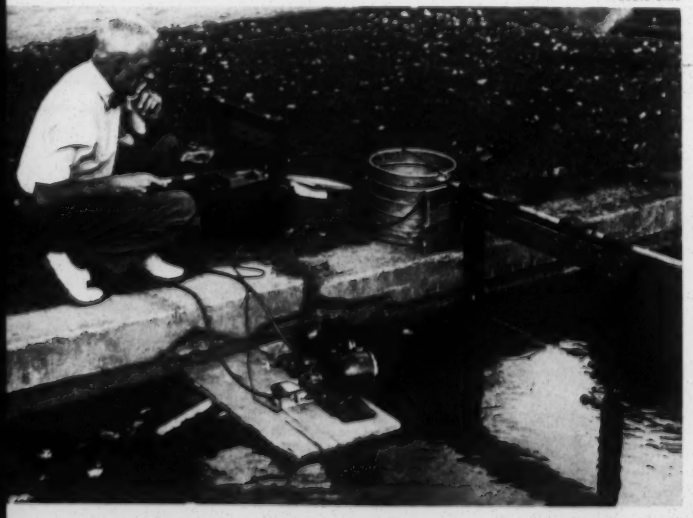
To improve the sport, brown trout were introduced from Europe in 1884. The new arrivals throve in the warmer water, but were hard to catch. Gaudy lures that attracted brook trout didn't interest the sophisticated Europeans. They would rise only to good imitations of natural insects. Fishing became more subtle.

As settlers reached the Rocky Mountains, they found a whole series of new trouts—rainbows, cutthroats, and later the goldens.

Today one of every four men in the United States fishes. Trout fishing is strongest in the northeast and the Rocky Mountains. It accounts for much of the $800,000,000 spent each year on fishing gear.

With all the recent innovations in rods, lures, and lines, fishermen stick to their traditions. The earliest known angling book in English, the *Treatyse of Fysshynge Wyth an Angle*, printed in 1496 in Westminster, England, listed 12 fly patterns. Ten of them are still catching fish. F.S.

LOUIS LIND



LEAPING TROUT split the air so fast that Photographer Treat Davidson was forced to design a special camera arrangement to capture the action portrait above. Springing for a hookless fly, the fish broke a beam of light (dotted line), which automatically fired camera and speedlights to freeze him at 1/5000 of a second. The picture was made in the Federal trout nursery in Cherry Grove, Pennsylvania.

UMI

"Why do you work? To make a lot of money so you can stop? Well, I've never started."

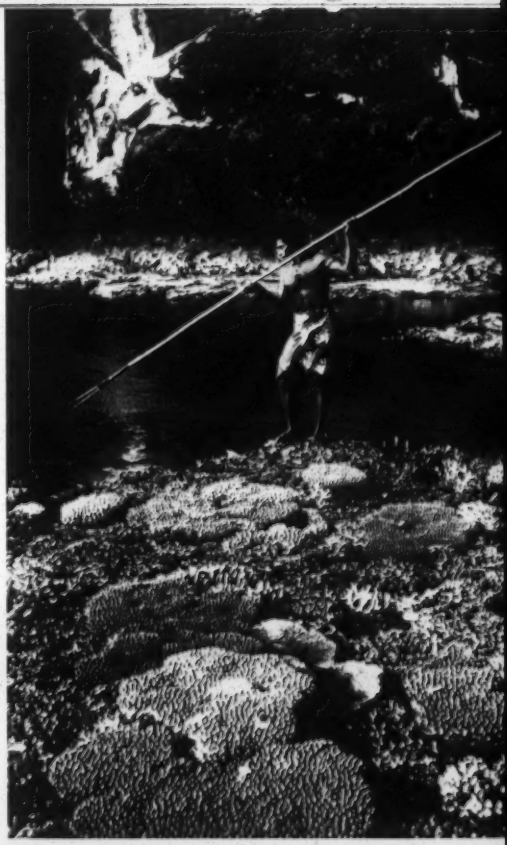
Fiji consists of more than 300 islands scattered like a handful of emerald dust across the southwest Pacific midway between New Zealand and the Equator.

Like the Hawaiian Islands, most of the Fijis are volcano tops splitting the sea. Heavy rains urge green forests up the southeastern slopes to the blue peaks of the central highlands. A bank manager in Suva quipped to *National Geographic Magazine* writer Luis Marden:

"When you can see those mountains, it's going to rain, and when you can't see them, it's raining." ("The Islands Called Fiji," *National Geographic Magazine*, October, 1958.)

Yellow-green rectangles of cane sugar —Fiji's leading export—make patchwork of the valleys. On coral reefs men and women herd fish into submerged nets (below).

Fijian spears are now aimed at fish (right) or brandished at ceremonial dances instead of in battle. The booming *lali*—the hollow log drum that once called islanders to war and cannibal feasts—now signals the end of class in the village schoolhouse (above).



Yet some early customs linger. On the island of Mbengga, islanders march barefoot across red-hot stones without a cry of pain, or even a blister. Village women massed on a cliff call great turtles out of the sea depths with an ancient chant.

But Suva is part of the 20th century. Made wealthy by exports of gold, sugar, and copra, it ranks as the most important city in the Pacific islands, after Honolulu. E.S.

UMI

PHOTOGRAPHS BY LUIS MARDEN, NATIONAL GEOGRAPHIC STAFF

FIJI ISLANDS *ENJOY PALMY DAYS*

FOR THE FIJIAN, it's always summertime—and the living is easy.

His pleasant, thatch-roofed village stands beneath waving palms. Handsome men in bright skirtlike *sulus* carve wooden bowls while smiling girls weave mats of pandanus leaf, their black hair adorned with blood-red hibiscus and scented with coconut oil. Overhead flit parrots of brilliant green, red, and blue.

From his vegetable patch, the islander collects taro, yams, beans, and pumpkins. The sapphire waters around his islands teem with fish. If he needs a house, there's plenty of reed, bamboo, palms, and tree ferns handy in the forest.

What he cannot produce himself he gets from his tribal group, for rural Fiji lives in an atmosphere of share and share alike.

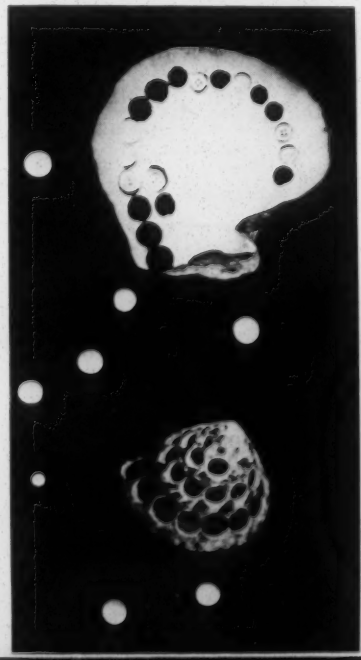
To a bustling worker in Suva, the Europeanized capital, or to an American businessman trying to "do" the islands in a two-week vacation, the Fijian will say:

LUIS MARDEN, NATIONAL GEOGRAPHIC STAFF, ABOVE AND RIGHT

BRIGHTLY DRESSED tribesmen carry the British Governor of Fiji and his aide-de-camp from their yacht toward shore in the manner of old time Fiji's highest chiefs. They chant and shout defiance of possible enemies. At Suva (below) two chiefs wait to present visiting Queen Elizabeth II the ceremonial whale's tooth, symbol of welcome in the islands.

HOWELL WALKER, NATIONAL GEOGRAPHIC STAFF

FIJIAN craftsmen make pearl buttons from oyster shells (upper) and trochus shells (lower) that grow on coral reefs ringing the Pacific islands.



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